Introduction

The use of this manual helps address the following common impacts of development:

- Altered site hydrology
- Increased stormwater runoff
- Increased flooding of rivers and streams
- Warming of water resources by heated runoff
- Reduced ground - water recharge and baseflow to rivers and streams
- Increased pollutant loadings to receiving waters

Mount Katahdin is one of Maine's many natural areas available for recreation and enjoyment. Valuable resources such as these must be protected from the negative impacts of human activities to ensure their availability and use for future generations.

Maine's inland and coastal waterbodies are among the state's most valuable resources and have historically been a source of pride for Maine's residents and visitors. Rivers, streams, lakes, wetlands, and coastal waterbodies complement our natural environment and provide a valuable resource for human use and enjoyment. To ensure that these resources are available for future generations to enjoy, we must collectively cooperate to preserve and protect them from the negative impacts of human activities.

Development opens up stable vegetated landscapes and increases impervious area, which in turn increases the amount and quality of stormwater runoff that leaves an area. The increased runoff contributes to flash flooding and reduces the amount of rainfall that would normally recharge groundwater to maintain baseflows. Development also increases pollutant concentrations in runoff, as pollution associated with development is deposited onto disturbed surfaces and carried by runoff into nearby waterbodies. Such pollutants include sediment, suspended solids, nutrients, pesticides, herbicides, heavy metals, chlorides, hydrocarbons, other organics and bacteria.

EPA has identified stormwater as a major contributor of pollution to surface waters and has established regulations to control its impacts.

Manual Contents:

Volume I: Stormwater Management Manual

Volume II: Phosphorous Design Manual

Volume III: BMPs Technical Design Manual

Regulatory Overview

Since the early 1970's, point sources of discharge (i.e., direct discharges of wastewater from municipal and industrial facilities) have become generally regulated under the National Pollution Discharge Elimination System (NPDES) by the U.S. Environmental Protection Agency (EPA). Since 2003, this program has been administered by the Department of Environmental Protection in Maine.

Point source discharges have measurably improved over the past 30 years, but the continued degradation of waterways led EPA to examine non-point sources of pollution (landscape based runoff, including stormwater). The 1987 Section 319 amendments to the Clean Water Act directed EPA to focus on the contribution of non-point sources of pollution and begin regulation of stormwater.

Section 6217 of the Coastal Zone Act Reauthorization amendments of 1990 calls for states to develop and implement non-point source pollution control plans for the coastal watershed. Other federal efforts to control non-point source pollution include:

- the National Estuary Program (Clean Water Act Section 320),
- Groundwater Protection programs (Safe Drinking Water Act Amendments and others),
- the Wetland Protection Program,
- the NOAA Coastal Zone Management Program (also Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990), and
- several USDA programs specifically geared towards reducing non-point source pollution from agricultural production.

In addition to the regulatory programs listed above, the 303d Section of the Clean Water Act requires states to develop a '303d' list of all waterbodies that do not meet water quality standards. States are then required to develop a 'TMDL Report' or Total Maximum Daily Load for all waterbodies on the 303d list. A TMDL analyzes the source of the degradation, defines pollution limits and describes a path to achieve compliance with water quality standards. Stormwater is the cause of pollution for many waterbodies on Maine's 303d list. Maine DEP expects the implementation of the BMPs described in this document will help prevent future problems and reverse past degradation.

DEP Urban Streams Program

During its first fifteen years, the MDEP's Biological Monitoring Program primarily monitored the water quality of rivers and streams impacted by point source discharge. More recently, biological monitoring has expanded to include streams impacted by nonpoint source (NPS) pollution. Under this monitoring program, a number of rivers and streams have been identified as impacted by development.

In 2003, MDEP collected biological, physical, and chemical data in four urban streams to better understand the impact of development. In these streams, toxics were rated as the top stressor. Other stressors included degraded in-stream habitat, increased sedimentation, and altered hydrology. The urban sources of impairments include: a high percent of impervious surfaces, industrial operations, road runoff, input of winter road sand/road dirt, spills and dumping, CSO input and channelizations.

A full report can be found at: www.state.me.us/dep /blwq/docmonitoring/ stream/index.htm

Objective of This Manual

Maine DEP has developed this manual to provide Professional Engineers, developers and municipalities with information to improve the management of stormwater and its impacts. The manual provides information on selecting, designing and installing **Best Management Practices (BMPs)** for stormwater management in the State of Maine. The manual has three volumes as follows:

Volume I – Stormwater Management Manual
This volume provides general information on the impacts of development, common problems with standard BMP designs and what can be done to control stormwater runoff and associated pollutants. It is intended for the general public, municipalities, watershed groups, developers, engineers and designers.

Volume II – Phosphorus Design Manual
This volume outlines Maine's phosphorus standards, which limit the amount of phosphorus that new development can add to a lake. It also outlines methods for reducing phosphorus loadings to meet the established standards.

Volume III – BMPs Technical Design Manual
This volume provides technical information to assist in the selection and design of BMPs to control stormwater runoff and its impacts.

BMP DEVELOPMENT & PERFORMANCE

The information included in this handbook is drawn from state-of-the-art technology or currently recognized practices cited in recent literature. The purpose of estimating removal efficiencies is to provide both designers and reviewers with consistency in developing stormwater plans. Also, new BMPs may be added as applicable new technologies are developed.

A BMP is a structure or practice designed to minimize the discharge of one or more pollutants to the land surface and their wash-off by stormwater, or to temporarily store or treat urban stormwater runoff to reduce flooding, remove pollutants, and provide other amenities.

Engineers and designers are encouraged to use the information contained in this manual in developing stormwater management programs. All practices should be based on sound engineering and environmental judgment, and should be specifically adapted to the sites to which they are applied. Some technical assistance and services may also be available from the Department of Environmental Protection and the state's Soil and Water Conservation Districts to help prepare and to review stormwater management plans.

This manual is not intended to be an all-inclusive source of information, as stormwater management is an evolving and developing science, and the conditions of each site are unique. New stormwater management methods may be available and the engineer is encouraged to use alternative approaches. However, to provide satisfactory and consistent results, all designers should adhere to the basic principles and guidelines of stormwater management.